

1           1.    A method comprising:  
2                forming a trench in each of two semiconductor  
3 substrates;  
4                providing a catalyst in the trench; and  
5                combining said substrates in face-to-face  
6 abutment with said trenches in alignment with one another.

1           2.    The method of claim 1 including forming a channel  
2 that communicates from opposed ends of each trench to the  
3 edge of each substrate to allow fluid to circulate through  
4 the substrates via the channels and the trenches.

1           3.    The method of claim 1 including combining said  
2 substrates using copper-to-copper bonding.

1           4.    The method of claim 3 including masking said  
2 catalyst to avoid coating the catalyst with the copper.

1           5.    The method of claim 4 including lifting off a  
2 resist to remove the copper from the catalyst.

1           6.    The method of claim 1 including depositing the  
2 catalyst in the trench.

1           7.    The method of claim 6 including depositing  
2 platinum or lead in said trench.

1           8.    An integrated re-combiner comprising:  
2                first and second semiconductor substrates, said  
3 substrates bonded in face-to-face abutment;  
4                each of said substrates including a trench, the  
5 trench in each substrate aligned with the trench in the  
6 other substrate; and  
7                a catalyst material in at least one of said  
8 trenches.

1           9.    The re-combiner of claim 8 wherein said catalyst  
2 material lines both of said trenches.

1           10.   The re-combiner of claim 8 including channels  
2 which communicate from the edges of said substrates to said  
3 trenches to allow fluid circulation.

1           11.   The re-combiner of claim 8 including copper-to-  
2 copper bonding between said substrates.

1           12.   The re-combiner of claim 8 wherein said catalyst  
2 is platinum.

1           13.   The re-combiner of claim 8 wherein said catalyst  
2 is lead.

1        14. A method comprising:  
2                forming a trench in an integrated circuit  
3 substrate;  
4                lining the trench with a catalyst material to  
5 remove gases from a circulating fluid;  
6                forming channels that align with said trench to  
7 allow fluid circulation across said substrate and through  
8 said trench.

1        15. The method of claim 14 including protecting said  
2 catalyst when forming said channels.

1        16. The method of claim 14 including depositing  
2 platinum as said catalyst in said trench.

1        17. The method of claim 14 including depositing lead  
2 in said trench of said catalyst.